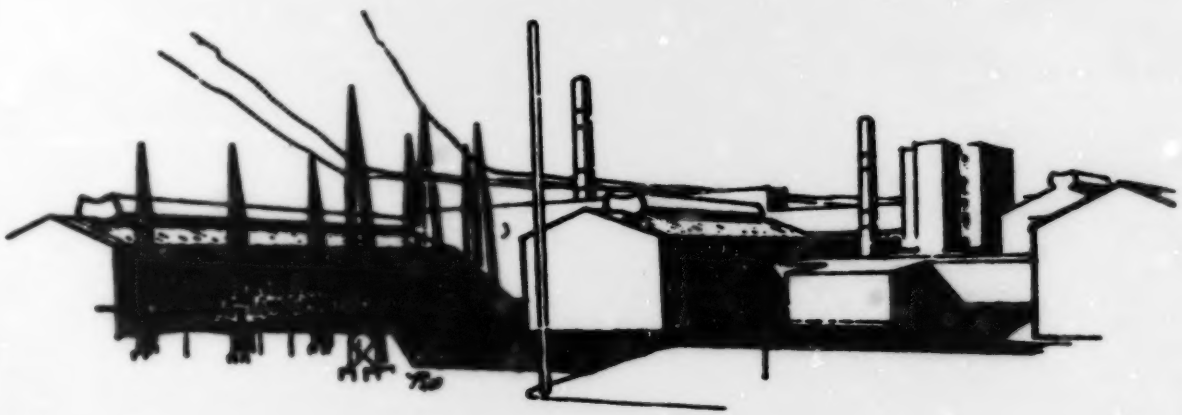
ARCO Aluminum

Government of Newfoundland and Labrador

NEWFOUNDLAND GREENFIELD ALUMINUM SMELTER

JOINT FEASIBILITY STUDY

SUMMARY REPORT



APRIL, 1983

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ACKNOWLEDGEMENTS

THIS STUDY WAS PREPARED BY:

ARCO ALUMINUM, LOUISVILLE, KENTUCKY
DEPARTMENT OF DEVELOPMENT, GOVERNMENT OF NEWFOUNDLAND AND LABRADOR

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1.0 Introduction

1.1 Background

In early 1980 the Government of Newfoundland approached ARCO Aluminum (formerly Anaconda Aluminum Company) with a presentation outlining the hydroelectric power potential of the Lower Churchill River in Labrador and the incentives available to a high energy consumer in the form of reasonable long term power rates. This initiative was part of a major marketing effort by the Government and Newfoundland and Labrador Hydro to promote Labrador power with a view to attracting an energy intensive industry whose electrical demand would assist in the triggering of the Lower Churchill development.

On the basis of this presentation, a review of the Province of Newfoundland as a potential site for a new aluminum smelter was conducted internally by ARCO Aluminum which indicated that further investigation was warranted. A series of meetings between senior representatives of the Newfoundland Government and ARCO Aluminum resulted in eventual agreement for the initiation of a joint feasibility study into the construction and operation of a world class aluminum smelter in the Province. The Island of Newfoundland and the Labrador mainland are distinct regions in the Province. Accordingly, York Harbour in the Bay of Islands and North West Point in Labrador were selected as representative site locations for the two areas.

1.2 Agreement

The formal agreement to conduct the joint feasibility study was signed on December 1, 1981. The purpose of this study was to determine the economic viability of a smelter at either representative location. In addition, areas

such as transportation, environmental, labour, public opinion and economic impact would be studied at a preliminary level to gauge their effect on the overall investment. As the feasibility study would contain considerable disclosure of proprietary technological and financial detail, a high degree of confidentiality was assigned to the study results. This summary report, therefore, is restricted to the salient findings of the joint study effort.

A coordinating committee consisting of representatives from ARCO Aluminum and the Department of Development was responsible for the overall administration and direction of the study including the preparation of the final report. A joint study team, which also included a representative of the Government of Canada, supported the coordinating committee in carrying out its mandate. The expenditures for consultant work was not to exceed a budget of $500,000 CAN.

1.3 Study Approach

Although most of the technical and financial expertise to conduct the feasibility study was available within either ARCO Aluminum or the Department of Development, certain aspects required the specific input and resources of outside consultants. These were:

. Engineering
- Fenco Lavalin, Montreal
- Nolan Davis & Associates, St. John's
- Public Works Canada, Ottawa

. Environmental
- Environmental Strategies Inc., New York
- Fenco (Nfld) Ltd., St. John's
- Northland Associates Ltd., St. John's
- Wildland Associates, St. John's

. Labour Relations - Omnifacts Research Ltd., St. John's

. Public Opinion - Research Associates, St. John's

. Transportation - Acres Consulting Services Ltd., Toronto

2.0 Primary Aluminum Industry

2.1 The Current Picture

In mid-1982 world primary aluminum capacity was estimated at 16,586,000 tons per annum. ARCO Aluminum owns and operates smelters at Sebree, Kentucky and Columbia Falls, Montana. The total capacity of their two smelters is 360,000 tons or 2.17% of the world total.

Tabulated below is the geographic distribution of the 1982 capacity:

Primary Aluminum Capacity
Free World
(ooo's tons)

	1982 Estimates
North America	
United States	6,100
Canada	1,506
Latin America	1,231
Europe	4,914
Africa	668
South Asia	1,025
East Asia	388
Oceania	754
Total	16,586

Source: The Spector Report

The past two years, particularly 1982, have been extraordinarily bad years for the aluminum industry, like most industries. The prolonged recession has led to extremely large and unusual reductions in the demand for aluminum. Capacity utilization rates in the United States fell to the 60% range in 1982. The non-U.S. capacity has

been much slower to react to current market conditions. The non-U.S. metal system, therefore, has been out of balance, thus prolonging the problems of the aluminum industry in a recessionary period. Metal has been produced at levels for which there is no market price justification. In the face of weak demand, inventories have been built too high, thereby exerting continued downward pressure on prices. The spot price for aluminum ingot at the end of 1982 was approximately $0.50 U.S. per pound compared to $0.75 per pound during 1980.

2.2 The Future Outlook

Looking to the future, the aluminum industry holds promising opportunities. Aluminum will continue to be in demand in the long run due to its attractive properties of light weight, strength, diversified end-use applications and recyclability. During the 1960-80 period world wide aluminum consumption grew at approximately twice the growth rate of world real Gross National Product (GNP). Over the balance of this century world GNP is projected to average 2-3% per annum. Our conservative forecast calls for aluminum consumption to parallel real world growth for the years ahead. Even under these circumstances the need for primary new capacity is significant. Assuming a metal supply/demand balance by 1985, a 2% growth per year will require new capacity of 350,000-400,000 tons per year, excluding the necessary replacement of economically obsolete capacity. This tonnage, if met through new greenfield capacity, translates to about two new smelters per year of the size studied in this report. In more practical terms, new primary metal requirements will be met through incremental expansion of existing facilities, increased recycling of scrap and new greenfield capacity.

2.3 The Process

The production of aluminum from alumina is achieved by the Hall-Heroult process of electrolytic dissociation of alumina dissolved in a reduction cell, or pot, containing a molten bath of cryolite. When the alumina (Al_2O_3) is reduced, the released oxygen rises up through the top of the cell while the molten aluminum settles to the bottom of the cell. The pots are tapped by means of vacuum equipment which draws the metal up into a crucible. It then is conveyed to the casting shop. Here molten aluminum first is charged into holding furnaces where impurities are removed and, if applicable, alloying metals added. The metal then is cast into a variety of ingot forms for downstream fabrication.

Pots are linked together electrically in series to form the potline, the basic production unit of the reduction plant. The feasibility study assumed the plant to have three potlines, each with 128 cells, producing 345,000 lbs of aluminum per potline per day. With this production of 180,000 tons of metal per year, the proposed facility would consume approximately 500,000 tons of raw material and 350 megawatts of electrical energy. An aluminum smelter must have a reliable and continuous source of energy, raw materials and labour each of which must not deviate significantly in quality or quantity if the smelter is expected to operate efficiently after start-up. The plant would run for 24 hours a day (three continuous shifts), 365 days a year. Any interruption in the operation of a smelter in excess of a couple of hours has profound effects on the expected long life of the reduction cells and is extremely expensive. Excluding lost production, it is not unreasonable to consider costs in excess of $10 million 1982 U.S. as the expected expenses for the restart of a shut down aluminum smelter.

3.0 Site Investigation

3.1 Basic Plant Requirements

Approximately 200 to 300 acres of relatively flat land with a minimum soil bearing capacity of 2500 p.s.f. are required. In addition, a buffer zone of approximately 3000 acres is standard for an aluminum smelter complex for environmental reasons.

The requirements for raw materials and finished product necessitate an adjacent and reliable mode of water and/or rail transportation with the associated infrastructure.

A reliable and economical source of electrical energy is a fundamental prerequisite for any smelter operation.

Water requirements for a plant are approximately 400,000 gallons per day.

Adequate infrastructure and an available and trainable workforce, up to a maximum of 950 persons during normal operation, must be present in the region to support the operation of an aluminum smelter.

3.2 Overview of Study Regions

The Province of Newfoundland satisfies the basic plant requirements for an aluminum smelter investment. Within the Province, the following two distinctive regions were considered as potential plant sites:

1. North West Point, in the western end of Lake Melville in Central Labrador, is in close proximity to the Churchill River hydroelectric potential. This plant site is approximately 25 miles northeast of Happy Valley-Goose Bay which currently supports a population of 7100. Its economy is now based primarily on the government and

service sectors. In the past, Happy Valley-Goose Bay was the site of a major allied military air base with the USAF dominant. In excess of 15,000 people resided there during peak times. The military presence, while scaled back considerably, continues to this day.

Because of the northerly location, climatic conditions are more severe in this area of the Province. Ocean transportation is restricted to a duration of about six months per year unless icebreaker services are provided through Lake Melville and its approaches. Seasonal navigation has a negative impact on construction costs and schedules and increases the required raw material storage facilities. The working capital that would be required for the larger inventories dictates that the operation of a world class aluminum smelter based on seasonal navigation is not practical. Ongoing studies initiated by the Department of Development have confirmed that maintaining a year round shipping corridor to a facility at North West Point is technically feasible. This feasibility study has assummed that year round access by ocean going vessels to North West Point will be possible.

2. York Harbour is located in the Bay of Islands area of Newfoundland. The potential plant site is approximately 30 miles west of Corner Brook, an established industrial and service center which has a population of around 25,000.

Year round shipping into York Harbour is possible as the area enjoys natural advantages for the location and operation of a marine facility. While existing infrastructure, climatic conditions and navigational considerations initially favour the Island site, it is considerably further away from the hydroelectic power source located in Labrador.

3.3 Geotechnical Investigation

Geotechnical work was conducted at both locations based on reviews of topographic and hydrographic charts and aerial photographs which established potential, relatively flat development sites. At York Harbour, both onshore and offshore testing consisted of boreholes and dynamic penetration tests which led to the eventual selection of the proposed sites for the plant and the wharf facility.

A more limited geotechnical program consisting of test pit excavation was sufficient at North West Point owing to the adequate onshore and offshore investigation carried out previously for this site in the Port Labrador Study completed in 1980.

Favourable onshore subsurface conditions were found at each site. Offshore subsurface conditions were markedly different for the two sites. The preliminary testing at the York Harbour wharf site indicated a competent bearing stratum within 10 to 16 ft of the sea bottom. These conditions would support a cost effective gravity-type marine structure. Offshore subsurface conditions at North West Point generally consist of very soft clayey silt with sand seams. This very weak bearing material dictates high structural costs for a wharf facility in the area. The facility would have to be supported by bearing piles extending approximately 260 ft into the sea bottom.

4.0 Capital Cost Estimates

4.1 Scope

Conceptual capital costs have been developed for the York Harbour and North West Point alternative plant sites. These estimates are based on conceptual layout, design criteria, lists of major equipment and service requirements.

The estimates assume that one major design/construction firm would be responsible for the detailed design, procurement and construction management. It also is assumed that an ARCO Aluminum project task force would be required to administer the total project.

The estimates are based on June 1982 pricing levels and are reported in U.S. dollars.

4.2 Capital Cost Estimates

The 180,000 STPY smelter cost estimates are as follows:

TOTAL ESTIMATED PROJECT COST
GRAND SUMMARY COMPARISON
($ Millions U.S., 1982)

	York Harbour	North West Point
Construction	607.3	625.7
Engineering and Construction Management	45.5	46.9
Owner's Cost (Includes Project Team, Start-up Working Capital and Business Systems)	107.6	131.7
Wharf	23.2	82.1
Contingency	61.1	68.0
Total Cost (June 1982)	844.7	954.4

5.0 Transportation

5.1 Scope

The transportation aspects of the feasibility study were concerned with the inward movement of raw materials from a number of supply sources and the outward movement of ingot to fabrication destinations.

Marine transportation is the only viable means of transporting material requirements at either plant location in the Province. York Harbour is located in an area currently provided with year-round shipping service and extension of such service to accommodate a smelter operation would be straightforward. North West Point, on the other hand, would require icebreaker support for six months of the year.

5.2 Access Alternatives

For a smelter located at North West Point, two marine access alternatives exist:

1. Year-round access by icebreaking cargo ships; and
2. Year-round access by icebreaker supported, ice-strengthened cargo ships.

Both alternatives would require vessels to be specially built for the trade, either by ARCO Aluminum or by a shipowner who would charter the ships to ARCO on a long-term basis. This arrangement would be necessary since there is little likelihood of being able to competitively charter such ships on the open market. The M.V. Arctic is the only icebreaking bulk carrier in operation at present and the necessary ice-strengthened ships for this operation represent less than one percent of all bulk carriers. Any vessels built for a North West Point operation could be chartered out in the high Arctic during the summer months to earn revenue.

For a smelter located at York Harbour, year-round access by conventional ships would be possible with occasional icebreaker assistance required.

5.3 Ship Sizes

Generally, the lowest annual transportation costs are obtained using a 40,000 dwt bulk carrier for alumina shipments and a combination of 10,000 and 20,000 dwt vessels for aluminum ingot, petroleum coke, pitch and other commodities.

5.4 Cost Differential

The annual transportation costs for a smelter located at North West Point are approximately 30% higher than the York Harbour alternative. This differential can be principally attributed to increased transit times due to ice conditions in Lake Melville and its approaches.

6.0 Environmental

6.1 Scope

Flora and fauna studies were carried out to identify the environmental issues associated with an aluminum smelter located at York Harbour or North West Point. Field studies were conducted only where available data or knowledge was insufficient to assess the development areas. The studies were not intended to serve as an environmental impact statement.

6.2 Flora

The vegetation found at York Harbour and North West Point is typical of that found over large areas of Newfoundland and Labrador. The sites are not unique and no rare or endangered species could be found during field surveys. Land and forest capability is limited generally by soil infertility, excess moisture and climatic exposure.

6.3 Fauna

York Harbour - Wild Cove Pond and its tributaries contain brook trout which are of local recreational importance. The Humber and Serpentine Rivers are important regional salmon waters. Lobster is the principal marine specie fished commercially in the vicinity. Waterfowl make seasonal and periodic use of the habitat in the area, although major migration routes and staging areas are not found in York Harbour. The Valley system provides good habitat for small game and is a part of the predatory range for other fauna such as mink, fox and lynx. A caribou herd, numbering around 100 animals, has its summer range on Blow-Me-Down Mountain. A portion of their winter range extends into the York Harbour Valley. The density of moose in the Valley system is extremely low.

North West Point - Few marine fish and no shellfish occur inside the narrows of Lake Melville due primarily to the low salinity of the lake. Salmon and brook trout occur in most local water courses. While the North West Point area does not provide good waterfowl habitat, the greater region has important waterfowl breeding and staging areas. Limited populations of small game exist in the development area. The major fur habitat in Labrador is located in the Churchill River system. North West Point does not provide good moose and caribou habitat by comparison to the capability of the greater region and sitings have been rare. Black bears are likely summer/early fall visitors to the area. The ringed seal population of Lake Melville has been estimated at 2935 ± 60%, with the domestic hunt identified as a contribution to the local economy.

6.4 Development

Construction of an aluminum smelter at either site would require an area of 200 acres of vegetation and wildlife habitat. The habitat loss would have little effect on wildlife populations. As is also the case with vegetation, no known rare or endangered species would be affected.

Gaseous fluorides emitted from an aluminum smelter would affect the photosynthetic process of some vegetation. Sensitive plants close to the smelter might exhibit visible symptoms of fluoride exposure but the area affected would be small and located entirely within the plant boundries.

Increased fluoride levels in the animals which consume vegetation grown in the vicinity of the smelter can be expected. This impact is greatest on domestic animals, such as cattle, which are confined to a single

area. Wild animals, such as moose and caribou, range over a wide area and vegetation with elevated fluorides would constitute a very small portion of their diet. Further, most animals naturally would avoid developed areas. Lichen sensitivity to fluoride is well known; thus, food availability to the caribou at York Harbour might be reduced depending on the extent of their range and feeding into the Valley. The caribou range from summer to winter would shift with the presence or absence of available food.

7.0 Labour

7.1 Construction

An adequate supply of construction labour currently is available in the Province to meet the major requirements of the proposed facility. Coordination between Government, unions and contractors is a prerequisite to ensuring that Provincial labour receives the maximum benefit possible. Simultaneous development of a Lower Churchill power project should not, by itself, create local labour supply problems because of the differing skilled trade requirements.

Site labour requirements over the four year construction period would average 625 with a peak site presence of 1200. The total wage bill for labour employed on site over the period would be in excess of $100 million CAN. This basic labour cost would be very much the same for the two alternative sites. The overall labour costs in Labrador would be higher, however, due to the necessity for subsidized transport, etc.

7.2 Operation

During the normal operation of the proposed facility, it is estimated that 950 people would be employed on site on a full-time basis. This schedule would be comprised of 500 hourly production workers, 180 maintenance trade workers and 270 salaried personnel ranging from clerical staff to managers.

Based on labour availability records, the following assumptions were considered reasonable for manpower recruitment in each development area:

	Corner Brook		Happy Valley-Goose Bay	
Employees	Local	Non-local	Local	Non-local
Production	80%	20%	15%	85%
Maintenance	50%	50%	20%	80%
Salaried	30%	70%	20%	80%

Non-local recruitment implies a population shift into the respective region under consideration, primarily from within the Province. The annual wage and salary bill for the smelter's operating labour force would be in the neighbourhood of $35 million CAN.

8.0 Public Opinion

8.1 Scope

A public opinion survey was carried out to determine how the populace in the two potential development regions felt about their quality of life, economic growth and industrial development.

Phase I of this effort involved a quantitative survey of residents by telephone during the second and third weeks of April 1982 to 204 respondent households in the Bay of Islands and 183 in Central Labrador. Phase II involved a qualitative survey of native and special interest groups in the Labrador study region.

8.2 Results - Phase I

The results indicated that residents in both regions are reasonably content with their present quality of life. The areas were seen consistently as having a lot of community spirit, hard-working people and good environments for raising children. However, there is clear recognition of the need for community growth. Problems perceived in both regions relate primarily to unemployment and the cost of living.

With respect to development, the basic conclusion is that both regions would provide an environment of receptive public opinion to industrial development. The existing and perceived lack of future employment opportunities is no doubt a major factor shaping the positive attitudes of people towards new development. Overwhelmingly, the respondents see job creation as the most positive aspect of a major new industry in their area, thereby relieving somewhat the persistent problems of unemployment and

providing a much needed economic stimulus. The only significant concern of the respondents towards a major new industry is the risk of environmental pollution. Approximately 50% of the entire sample pointed to this area. Residents should be informed of the effectiveness of modern pollution control measures at every step in the process of events that would ultimately lead to the construction and operation of a reduction facility in the Province.

8.3 Results - Phase II

Based on personal interviews with spokepersons from special interest groups in the Happy Valley-Goose Bay area, it was concluded that:

1. native peoples are unwilling to discuss industrial development in their region until the fundamental issues of their land claims have been resolved;
2. the main problems of industrial development are perceived as
   - the conflict with the cultural objective of returning to traditional lifestyles
   - the disruption of their community from an influx of non-natives; and
3. other interest groups who had a public stand on industrial development were in general favourable, but held reservations with respect to environmental impact.

With respect to native land claims and resource development in Labrador, the Government of Newfoundland and Labrador holds the position that the special relationship of the people to the land has to be recognized in future developments. The Province also realizes the challenges, opportunities and rewards of new lifestyles which can be brought about through a rational program of resource development.

9.0 Economic Impact

9.1 Scope

This effort provided estimates of the expected impact of the construction and operation of a reduction facility in the Province on the levels of income and employment in the Province and Canada. The study was preliminary in nature serving to highlight the important features of the proposed development. The only adequate analytical tool available for this purpose was Statistics Canada's Inter-provincial Input-Output Model of the production system. The estimates derived, therefore, reflect the impact of the investment for the Province as a whole. The measure of the economic activity used was the Province's and Canada's Gross Domestic Product (GDP) which measures the total value of goods and services produced in a given year.

In assessing economic impact, the effects on the Province's economy of investment and other types of spending is weak in comparison to other provinces, notably Ontario and Quebec. This weakness can be attributed to the undiversified nature of the Newfoundland economy, the undeveloped state of the goods producing industries and the lack of manufacturing industries linked to the Province's resource base. Newfoundland is heavily dependent on exports of primary resources and imports of consumer and industrial commodities.

9.2 Construction

During the construction period the direct and indirect impact on the Gross Domestic Product (GDP) of Newfoundland, as well as Canada, would result from the following:

1. site labour income; and
2. expenditures on construction materials and construction equipment.

There would also be contribution to the GDP resulting from the economic activity induced by the income flows associated with the direct and indirect activities.

Thus the total addition to the GDP of Newfoundland and Canadian economies over the construction period is estimated $152 million* for Newfoundland and $284 million for Canada as a whole. The expenditure and income flows during the construction phase would create 2,737 man years of employment at the construction site and would generate another 1,123 man years of in-Province employment in Newfoundland in other economic activities.

Owing to the significant difference in the wharf capital costs at the North West Point site versus York Harbour, this particular component of the overall investment has been assessed separately. For York Harbour the economic impact of wharf construction can be expected to increase the GDP of Newfoundland by $22 million and the GDP of Canada overall by $34 million. For North West Point the increase in GDP of the Newfoundland and Canadian economies is $25 and $68 million respectively.

9.3 Operation

Due to the necessity to maintain a continuous, 24 hour a day operation of a smelter facility, extensive service facilities normally are established inside the plant gate. This arrangement ensures that the plant is basically self sufficient with respect to the general repair and maintenance of equipment and machinery. Interaction of the plant operation with the local economy typically is related to purchases of inventory items and various services, as well as a certain level of ongoing machining and metal fabricating requirements.

*All GDP estimates are in 1982 Canadian dollars.

The expected overall total annual direct, indirect and induced impact of the operation of an aluminum smelter on the GDP of Newfoundland is $45 million and $68 million for Canada as a whole. This estimate includes the earned incomes on site, inventory purchases and outside service contracts. The operation would generate annually approximately 325 man years of employment in Newfoundland in other economic activities.

9.4 Energy Purchases

The expected economic impact of ongoing energy purchases by a smelter operation, while significant, cannot be assessed realistically at this point in time. The actual power source, whether Upper or Lower Churchill or a blend of both, is uncertain. Given that the Lower Churchill is undeveloped at this point in time, the ability of a smelter investment in the Province to trigger such a development, thereby providing a secure and relatively cheap energy source for all consumers in the Province, requires further analysis. The, as yet, undetermined site for a smelter operation also would affect the levels of anticipated economic impact due principally to the transmission line configurations and capacities, which are markedly different for an Island versus Labrador site. The financing arrangements for new hydroelectric capital facilities and transmission lines also define the extent of economic impact particularly when capital factors originate outside of Canada itself. Because of the uncertainty surrounding both the private and public investments required to realize a smelter operation in the Province of Newfoundland, the economic impact of ongoing energy purchases only can be addressed realistically once a feasibility study has progressed into a definition stage.

10.0 Financial Evaluation

10.1 Method

While there are alternative methods for proceeding with a financial evaluation for a project such as this, the technique of a current dollar, discounted cash flow analysis was used.

10.2 Energy Pricing

The price of energy to the aluminum smelter was estimated by Newfoundland and Labrador Hydro based on the development of the Gull Island Project on the Churchill River. During the first ten years of operation the average energy price is 65 mills CAN per kilowatt hour (kwh) for North West Point and 80 mills per kwh for York Harbour (mid-1990 $).

10.3 Results

The base case results, expressed as an after tax rate of return, were:

York Harbour	North West Point
5.4%	5.2%

There is a trade off between the capital and operating costs of the two potential plant sites and thus the financial evaluation leads to very similar results for both areas. The cost and revenue expectations in the overall study have been examined in detail with the conclusion that the results of the financial analysis are not attributable totally to locational factors peculiar to a Newfoundland or Labrador site. The Province is a potential world class greenfield smelter site and the financial evaluation points to the current poor investment climate that the entire primary aluminum industry faces.

If the industry is going to have the incentive to construct and operate new capacity to meet future demand, something has to change in the cost and/or revenue expectations or other factors which would serve to improve the economic attractiveness of the investment. For example the current market price for primary aluminum is low, trading at approximately $0.60 U.S. per pound. Sensitivity analysis has shown that if aluminum traded at approximately 55% above the currently projected price levels the rate of return would be improved significantly. Key cost variables affecting the rate of return are capital cost and the price of power.

The trading price of aluminum is determined by the major primary producers, based on their projections of supply and demand. At present, the recession has weakened demand dramatically and, coupled with high inventories, the market price naturally has fallen to low levels. As the supply and demand of the metal system comes into balance, prices will stabilize. As demand grows over time the market place will become tight for the supply of product and thus, in the competitive situation, the price will rise. Once the price levels reach, or are anticipated to reach, a certain threshold capital investment in new capacity is justified.

11.0 Conclusions

The major conclusions of the Newfoundland Greenfield Joint Feasibility Study are noted below:

1. Newfoundland has the potential to be one of the low cost suppliers of hydroelectric energy in the world;

2. On balance, the Province of Newfoundland offers potential world class greenfield smelter sites. There are no factors that would by themselves eliminate the possibility of building an aluminum smelter at either of the two representative sites;

3. The plant would require 200-300 acres of land with a buffer zone of 3000 acres. This study assumed utilization of a prebake technology with a capacity of 180,000 STPY, expandable to 240,000 STPY. Project duration would be four years at York Harbour and five years at North West Point;

4. The capital cost for the facility as envisaged is approximately $850 Million ($1982 U.S.) for York Harbour and $950 Million ($1982 U.S.) for North West Point; however, the overall rate of return on investment for each site is comparable.

5. At the present time, an aluminum smelter is not an economic investment anywhere in the world given the current projected cost/revenue expectations. The financial results reflect the poor economic climate in the aluminum industry. Generally, the worst case assumptions were made in the financial analysis. An improvement in economic conditions, as we now appear to be seeing, will have a decidedly positive impact on the financial indicators.

6. An aluminum smelter in the Province of Newfoundland will not likely proceed until:

   a) aluminum market price forecasts increase by 50-60% over projected levels and/or;

   b) a large block of electrical energy becomes available from the Churchill Falls plant or a commitment is made to develop the Lower Churchill and/or;

   c) economic subsidies allow the project to achieve a satisfactory rate of return and/or;

   d) the aluminum industry determines that a primary smelter in the Province of Newfoundland is the least cost source of primary aluminum ingot to meet their future consumption needs.

7. The Federal/Provincial governments should continue to co-operate in the further investigation of the implications of various forms of assistance that could make an aluminum smelter investment more economically viable within the Province.